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*Contributions from the Laboratory of the University of Pennsylvania, No.
XVI.—On the Electrolytic Estimation of Cadmium.*

BY EDGAR F. SMITH, PH. D.

(Read at the meeting of the American Philosophical Society, Nov. 1, 1878.)

In a recent article published in the *American Journal of Science and Arts* (Vol. XVI., Sept., 1878), Prof. F. W. Clarke calls attention to the estimation of cadmium by electrolysis, which, however, proved unsuccessful—the cadmium being indeed thrown out of the solution but in such a form as to enclose impurities; yielding consequently unsatisfactory results.

Out of curiosity, to see what might be effected by substituting some other salt for the chloride, I employed an acetate solution and met with success, as the following experiments will show:

I. .1450 grms. cadmium oxide were dissolved in acetic acid, the excess of the latter expelled upon a water bath and the platinum crucible then about half filled with water, and placed upon a copper ring connected with the negative pole of a two-cell Bunsen battery, while joined to the wire leading from the positive pole was a strip of platinum foil extending into the acetate solution. The deposition of the cadmium upon the sides of the platinum crucible was regular and in a perfectly crystalline grayish white layer. In about three hours the separation was complete. The cadmium was first washed with distilled water, then with alcohol and finally with ether. It was dried over sulphuric acid. The metallic cadmium weighed .1270 grms. corresponding to 87.58 % Cd. The calculated percentage of metal in the oxide is 87.50.

II. .2046 grms. cadmium oxide placed in a small broad platinum crucible were dissolved in acetic acid and after evaporating the excess of the latter water was added—the solution, however, remaining rather concentrated. The platinum vessel was connected with the negative pole of a bichromate battery. To the copper wire of the positive pole was attached a platinum wire from which was suspended a small platinum crucible, which dipped into the solution in the larger vessel. The space between the walls of the two crucibles was not more than the eighth of an inch. Only two cells of the battery were employed. The deposit of cadmium here as in the first experiment was perfectly crystalline and metallic in appearance. Not the slightest trace of spongy metal was visible. The separation of the metal was finished in about the same time as in (I), and it was then washed and dried as above. Found .1790 grms. metal—corresponding to 87.48 % Cd.

From the various experiments made I have discovered that to obtain good results the following should be observed: 1st. Work with rather concentrated solutions of the acetate. 2d. Employ a sufficient number of cells of either battery to produce a rapid and rather energetic current.

October 31, 1878.